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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,829	03/30/2004	Armen Avoyan	LMRX-P037/P1258	5065

32986 7590 10/09/2007

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EXAMINER	
KACKAR, RAM N	
ART UNIT	**PAPER NUMBER**
1792	

MAIL DATE	DELIVERY MODE
10/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/813,829	AVOYAN ET AL.	
	Examiner	Art Unit	
	Ram N. Kackar	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *35,36,38,39,41,42 and 44-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *35,36,38,39,41,42 and 44-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 35-36, 38-39, 41-42 and 44-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In these claims the limitations "at least a start point of the at least one time range is delayed relative to at least a start point of the at least one time duration" in claim 35, limitation "the time window being less than the at least one time duration" in claim 45 and claim 36 are not understood. For limitations claiming a certain range of times or starting or ending events a clear chronology of events and/or time markers should be established. In these claims specifically the phrase "for the at least one time duration" is not understood. From the context it appears that a time window is being claimed so that the starting point of this time window occurs before an expected endpoint and continues beyond the expected endpoint so as to ensure that end point event is captured. The art rejection assumes this interpretation.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 35-36, 39, 41, 44-48 and 50 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Turner et al (US 5576629).

Turner et al disclose monitoring electrical parameters of a plasma during an etch process, (Abstract). Further the electrical parameters could be current, voltage, phase and their harmonics (Col 1 lines 8-14, Col 5 lines 1-14 and lines 50-65) and the harmonic analysis could be used for process control and determination of endpoint (Col 7 and Col 8). Specifically, Turner at al state that analysis of different harmonics allows for understanding the relation ship (model) of electrical parameters and process variables (Col 8 lines 22-33). Further this allows determination of end point or other process parameter done by comparing with predetermined historical data (Col 8 lines 20-47). The structural hardware provides for sensors for current and probe for voltage (Col 8 line 64-65). It is inherent and obvious that for generating a model from historical data a sample should undergo etching for a time period to fully enclose the end point in order to learn the behavior of the electrical parameter at the end point. Turner et al further disclose harmonic analysis of the applied fundamental frequency to develop a best model for endpoint determination while the applied frequency could be selected from 0.1-13.56 MHz which is generally recognized as the operating frequency range (Col 1 lines 20-25).

Regarding the amendment of time window, it is obvious that during the period when the model is being established electrical parameters should be monitored at least during the time endpoint occurs so as not to miss the endpoint. The whole idea of the generation of model is to take a snap shot of events occurring from a point just before endpoint to a point just after the endpoint.

5. Claims 35-36, 39, 41-42 and 44-50 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Butler et al (US 5458732).

Butler et al disclose monitoring electrical parameters of a plasma during an etch process (Col 5 lines 13-18) at both upper electrode as well as at lower electrode. Further the electrical parameters could be current, voltage, phase and their harmonics (Abstract, Col 3 lines 51- 63) and the harmonic analysis could be used for process control and determination of endpoint (Col 6 lines 64 to Col 7 line 1). Specifically, Butler et al state that different harmonics may have different behavior (Col 3 lines 56-63), which allows for selecting a suitable harmonic. Further this allows determination of end point or other process parameter done by comparing with predetermined historical data. It is inherent and obvious that for generating a model from historical data a sample should undergo etching for a time period to fully enclose the end point in order to learn the behavior of the electrical parameter at the end point. Further Butler et al disclose harmonic analysis of the applied fundamental frequency to develop a best model for endpoint determination while the applied frequency could be selected from up to 40 MHz.

Regarding the amendment of time window, it is obvious that during the period when the model is being established electrical parameters should be monitored at least during the time endpoint occurs so as not to miss the endpoint. The whole idea of the generation of model is to take a snap shot of events occurring from a point just before endpoint to a point just after the endpoint.

6. Claims 35-36, 39, 41, 44-48 and 50 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Miyashita et al (JP 08227875).

Miyashita et al disclose monitoring electrical parameters of a plasma, during an etch process and teach that end point is determined by monitoring a change in a specific harmonic (Abstract and claims 14-16 from the machine translation in English). Further Miyashita et al disclose determination of correlation between a specific harmonic and a material present in the plasma whose concentration changes at the end point (Paragraphs 11-13, 27-29).

Regarding the amendment of time window, it is obvious that during the period when the model is being established electrical parameters should be monitored at least during the time endpoint occurs so as not to miss the endpoint. The whole idea of the generation of model is to take a snap shot of events occurring from a point just before endpoint to a point just after the endpoint.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (5576629) in view of Kagoshima et al (US Pub 2003/0003607).

Turner et al disclose determination of end point or other process parameter done by comparing with predetermined historical data but do not disclose how actual measurement of etch depth is obtained.

Using SEM is common to measure etching depths as taught by Kagoshima et al (Fig 2).

Therefore using an SEM for actual measurement would have been obvious for one of ordinary skill in the art at the time of invention.

9. Claims 42 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (5576629) in view of Butler et al (US 5458732).

Turner et al do not disclose electrical parameter measurement at upper electrode as well as lower electrode.

Butler et al disclose monitoring electrical parameters of a plasma during an etch process (Col 5 lines 13-18) at both upper electrode as well as at lower electrode.

Therefore measuring electrical parameter at both electrodes would have been obvious in order to provide more choice in finding a parameter for endpoint detection.

Response to Arguments

Applicant's arguments filed 9/10/2007 have been fully considered but they are not persuasive. Applicants argument that time window is not claimed is not persuasive since it is obvious that one has to monitor the events at least around the point of interest which in this case happens to be an endpoint.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ram Kackar
Primary Examiner AU 1763